Accessory for
SUNNY BOY 2000HF-US
SUNNY BOY 2500HF-US
SUNNY BOY 3000HF-US

RS485-Quick Module

Installation Guide

RS485-QM-IA-eng-IUS111610 | IMUS-485QMODULE | Version 1.0

CA US

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IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS

This manual contains important instructions for RS485-Quick Module accessory, that must be followed during installation and maintenance of the inverter.

The RS485-Quick Module is designed and tested according to international safety requirements, but as with all electrical and electronic equipment, certain precautions must be observed when installing and/or operating the RS485-Quick Module. To reduce the risk of personal injury and to ensure the safe installation and operation of the RS485-Quick Module, you must carefully read and follow all instructions, cautions and warnings in this Installation Guide.

Warnings in this document

A warning describes a hazard to equipment or personnel. It calls attention to a procedure or practice, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the SMA equipment and/or other equipment connected to the SMA equipment or personal injury.

DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to personal injury.

Other Symbols in this document

In addition to the safety and hazard symbols described on the previous pages, the following symbol is also used in this installation guide:

Information

This symbol accompanies notes that call attention to supplementary information that you should know and use to ensure optimal operation of the system.

General Warnings

General Warnings

All electrical installations must be done in accordance with the local and *National Electrical Code*® ANSI/NFPA 70 or the *Canadian Electrical Code*® CSA C22.1. This document does not and is not intended to replace any local, state, provincial, federal or national laws, regulation or codes applicable to the installation and use of the inverter, including without limitation applicable electrical safety codes. All installations must conform with the laws, regulations, codes and standards applicable in the jurisdiction of installation. SMA assumes no responsibility for the compliance or noncompliance with such laws or codes in connection with the installation of the inverter.

For all repair and maintenance always return the unit to an authorized SMA Service Center.

Before installing or using the RS485-Quick Module, read all of the instructions, cautions, and warnings on the RS485-Quick Module in this installation guide.

Table of Contents

1 Information on this Manual 9
1.1 Validity 9
1.2 Target Group 9
1.3 Additional Information 9
1.4 Nomenclature 9
2 Safety 10
2.1 Appropriate Usage 10
2.1.1 RS485 interface 10
2.1.2 Multi-function relay 10
2.2 Safety Instructions 10
3 RS485-Quick Module 11
3.1 Scope of Delivery 11
3.2 Identification 11
3.3 Interior View of the RS485 Quick Module 12
4 Preparations for the RS485 Quick Module 13
4.1 Notes 13
4.2 Checking the Country Setting via the Rotary Switches 13
4.3 Configuring the RS485 Quick Module 14
4.3.1 Setting the language and installation country via the rotary switch 14
4.3.2 Communication via *Bluetooth* *16*
4.4 Terminating the RS485 Bus 17

5 Assembly 19
5.1 Open SMA DC-Disconnect 19
5.2 Connecting the RS485 Quick Module to the RS485 bus 20
5.2.1 Cable Requirements 20
5.3 Preparing the cable 20
5.4 Installing the Cable Pipe and Introducing the Cable into the Inverter 21
5.5 Replacing Standard Quick Modules with RS485 Quick Modules 22
5.6 Connecting the RS485 cable to the RS485 Quick Module . . . 23
5.7 Multi-function relay connection 26
5.7.1 Connection Requirements 26
5.8 Closing the SMA DC-Disconnect and Commissioning the Inverter 28
6 Decommissioning and disposal 29
6.1 Decommissioning 29
6.2 Disposal 29
7 Technical Data 30
8 Contact 31

1 Information on this Manual

1.1 Validity

This guide applies to the RS485-Quick Module (485QMUS-10-NR) for the following SMA inverters:

- Sunny Boy 2000HF-US (SB 2000HFUS-30)
- Sunny Boy 2500HF-US (SB 2500HFUS-30)
- Sunny Boy 3000HF-US (SB 3000HFUS-30)

1.2 Target Group

This manual is for qualified personnel. An qualified personnel has been sufficiently trained and has proven capabilities and knowledge relating to the construction and operation of the device. An qualified personnel is trained to deal with the dangers and hazards involved in installing electrical systems.

1.3 Additional Information

Detailed information regarding installation, commissioning, maintenance and troubleshooting can be found in the inverter installation guide.

Further information about SMA America, LLC equipment is available in the download section of the www.SMA-America.com website. Among other things, the download area contains the following items:

- Information on communication between devices by *Bluetooth* Wireless Technology by SMA America, LLC in the "SMA *Bluetooth* Wireless Technology" technical description
- Information on detecting a free NetID in a *Bluetooth* network can be found in the Sunny Explorer user manual.

1.4 Nomenclature

In this document, SMA America, LLC, and SMA Solar Technology Canada Inc. are hereinafter referred to as SMA.

The "RS485-Quick Module 485QMUS-10-NR" is referred to in the following as "RS485-Quick Module".

2 Safety

2.1 Appropriate Usage

The RS485-Quick Module is provided as an upgrade kit or included in the scope of delivery of the inverter.

The RS485-Quick Module is only suitable for use with SMA inverters of type Sunny Boy 2000HF-US / 2500HF-US / 3000HF-US. Please also observe the installation guide of the respective inverter.

2.1.1 RS485 interface

The RS485-Quick Module allows the setup of a cable-connected RS485 communication between the aforementioned inverters.

2.1.2 Multi-function relay

The RS485-Quick Module has a multi-function relay that can serve as a fault signaling contact, amongst other things. The inverter will trip the fault signaling contact as soon as an error occurs.

2.2 Safety Instructions

DANGER

Danger to life due to high voltages in the inverter.

- Only qualified personnel may perform work on the inverter.
- Disconnect the inverter on the AC and DC side as described in the inverter's installation guide.

NOTICE

Electrostatic discharges can damage the RS485-Quick Module and the inverter.

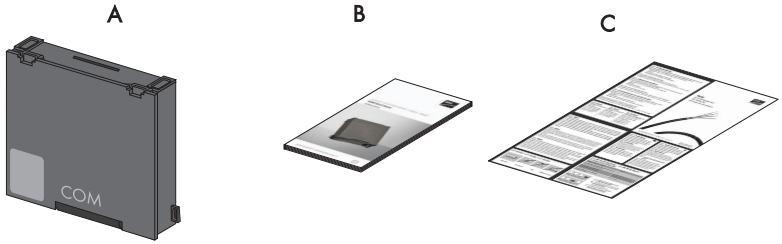
- Ground yourself before touching a component part. Touch PE or a grounded object.

3 RS485-Quick Module

The SMA inverters of the SB 2000 HF-US / 2500 HF-US / 3000 HF-US types are equipped with a communication module (Quick Module) and a *Bluetooth* Wireless Technology interface by default. You can retrofit the inverters with the RS485-Quick Module with an RS485 interface and multifunction relay. For this, exchange the Quick Module delivered with the inverter for an RS485-Quick Module.

3.1 Scope of Delivery

Check the delivery for completeness and for any visible external damage. Contact your dealer if anything is damaged or missing.

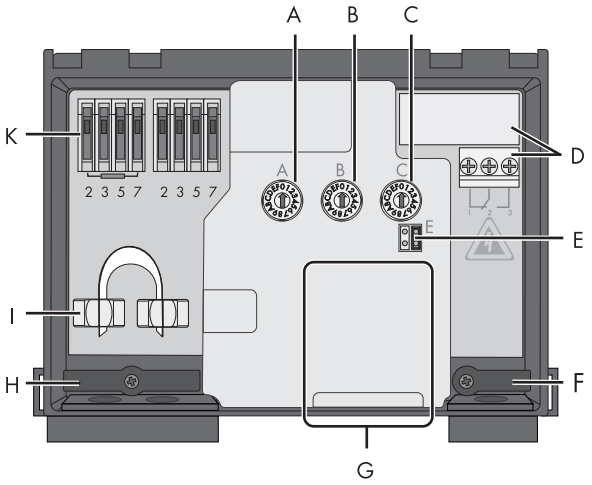


Object	Quantity	Description
A	1	RS485-Quick Module
B	1	Installation guide
C	1	RS485 cabling plan poster

3.2 Identification

You can identify the RS485-Quick Module by the type label. The type label is located on the outside of RS485-Quick Module cover. The type label contains, amongst other things, the serial number and the type designation of the RS485-Quick Module.

3.3 Interior View of the RS485-Quick Module



Object	Description
A	Rotary switch for setting the installation country
B	Rotary switch for setting the display language
C	Rotary switch for the configuration of *Bluetooth* communication
D	Multi-function relay and connection terminal
E	Jumper slot for setting the language to English
F	Strain relief for the cable of the multi-function relay
G	Slot for SD card
H	Strain relief for the RS485 cable
I	Shield clamps with 2 self-adhesive cooper foil strips
K	Spring-type terminal with connected resistor.

4 Preparations for the RS485-Quick Module

4.1 Notes

When the RS485-Quick Module is delivered, the resistor is located in the left spring-type terminal. If you do not wish to connect the inverter to the end of the RS485 bus, you must remove the resistor, in order to connect two cables.

4.2 Checking the Country Setting via the Rotary Switches

The factory default for the switches for setting the country configuration is at the 0/0 position.

If you install the RS485-Quick Module in an inverter, which has been in operation, and leave the switches in the 0 / 0 position, then the country setting in the inverter remains unchanged.

You can change the country setting of the inverter using the rotary switches of the RS485-Quick Module or a communication device. This overwrites the default network parameters. They cannot be restored, and must be re-entered via a communication device.

The meaning of the positions of the rotary switches in the RS485-Quick Module are the same as in the Standard Quick Module. Please read the inverter's installation guide to find the meaning of the rotary switches.

The inverter changes the country settings and the language immediately after switching on the line circuit breaker. If an un-programmed switch setting is selected, the inverter issues an error message.

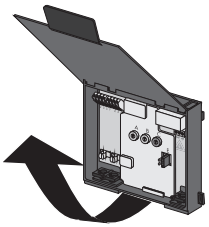
4.3 Configuring the RS485-Quick Module

4.3.1 Setting the language and installation country via the rotary switch

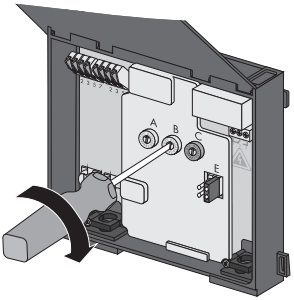
Configuration of the RS485-Quick Module Before Installation

If you have not yet installed the RS485-Quick Module, proceed as follows to set the installation country and the language:

1. Flip up the flap of the RS485-Quick Module and lift the cover until it snaps into place.



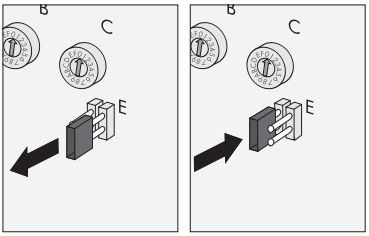
2. Using a screwdriver of width $^1/_8$ in. (2.5 mm), set the arrows on the two left-hand rotary switches (A and B) to the desired position. The meaning of the positions of the rotary switches in the RS485-Quick Module are the same as in the Standard Quick Module. Please read the inverter's installation guide to find the meaning of the rotary switches.



Jumper for English

You have the possibility to change the language setting to English using a jumper (e.g., during maintenance).

- Pull the jumper from the two right-hand pins and attach it to the two left-hand pins.



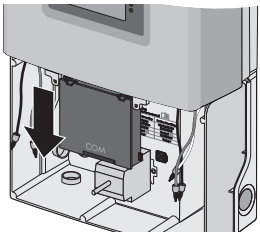
As soon as you have completed the work:

- Pull the jumper from the two left-hand pins and attach it to the two right-hand pins.

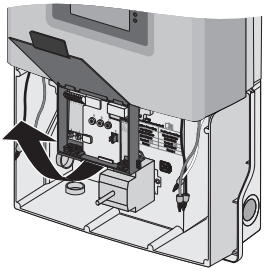
☑ The language and installation country have been set.

Configuration of the RS485-Quick Module After Installation

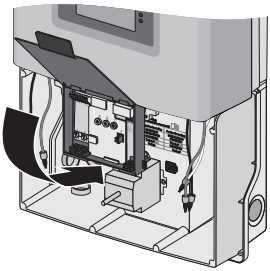
1. If the multi-function relay is already connected, switch off the multi-function relay power supply.
2. Open SMA DC-Disconnect (see section 5.1 „Open SMA DC-Disconnect." (page 19)).
3. Pull the RS485-Quick Module out to the stopper.

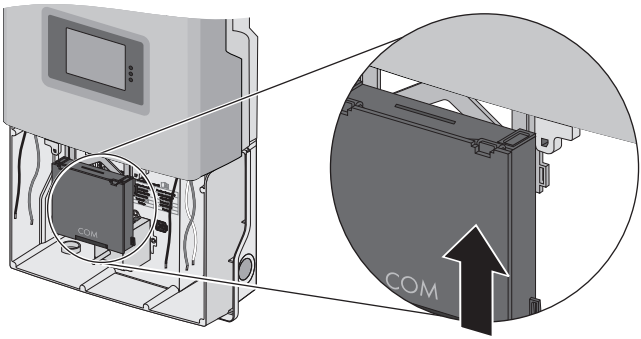


4. Flip up the flap of the RS485-Quick Module and lift the cover until it snaps into place.



5. Set the installation country and display language (see section 4.3.1 „Setting the language and installation country via the rotary switch" (page 14)).
6. Set the NetID for *Bluetooth* communication unit (see section 4.3.2 „Communication via Bluetooth" (page 16)).
7. Close the cover of the RS485-Quick Module and fold back the flap so that it snaps into place.





8. Push the RS485-Quick Module upwards.
9. Close SMA DC-Disconnect (see section 5.8 „Closing the SMA DC-Disconnect and Commissioning the Inverter“ (page 28)).

☑ The installation country, display language, and *Bluetooth* communication are set.

4.3.2 Communication via *Bluetooth*

Communication via *Bluetooth* with a communication device is activated ex works. Networking via *Bluetooth* with other inverters is deactivated ex works.

Possible settings using the rotary switch "C":

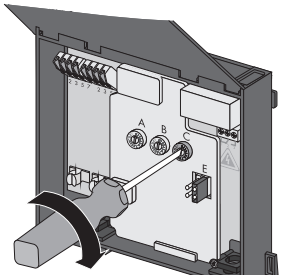
Switch position (NetID)	Setting
0	Off
1	*Bluetooth* communication with a communication device is possible. No networking with other inverters (default setting)
2 ... F	Networking with other inverters

The NetID helps distinguish PV plants with SMA *Bluetooth* that are within a proximity of 1640 ft. (500 m) of each other.

Detect a free NetID before commissioning your *Bluetooth* PV plant. This way you will make sure that you will not register any other *Bluetooth* PV plant in your proximity. Refer to the user manual of the "Sunny Explorer" software to discover how to detect a free NetID. The user manual of the "Sunny Explorer" program can be found in the download section at www.SMA-America.com.

In order for all inverters in your plant to be detected by your communication device, all inverters must have the same NetID. To assign a NetID, proceed as follows:

1. Using a screwdriver of switch $^{1}/_{8}$ in. (2.5 mm), set the arrow on the right rotary switch (C) to the required position.



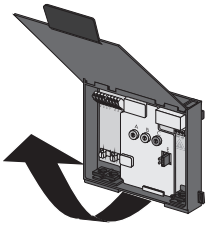
Saving the *Bluetooth* settings

The *Bluetooth* settings will first be accepted upon inverter commissioning.

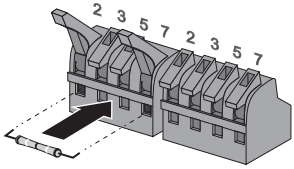
4.4 Terminating the RS485 Bus

You must set the termination only on the inverter that is connected to the end of the RS485 bus. When the RS485-Quick Module is delivered, the resistor for termination is located in the left spring-type terminal. If the resistor (wire resistor: 120 Ohms) is no longer connected, proceed as described in this chapter:

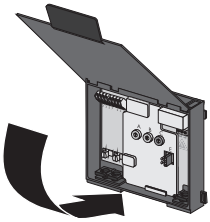
1. Flip up the flap of the RS485-Quick Module and lift the cover until it snaps into place.



2. Open spring-type terminals 2 and 7 of the left-hand connector.
3. Connect the resistor to spring-type terminals 2 and 7.
4. Close the spring-type terminals.



5. Close the cover of the RS485-Quick Module and fold back the flap so that it snaps into place.



☑ The RS485 bus is terminated.

5 Assembly

5.1 Open SMA DC-Disconnect.

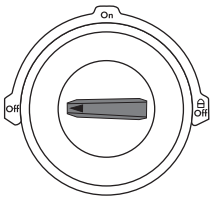
WARNING

High voltages in the inverter. Death or serious injuries.

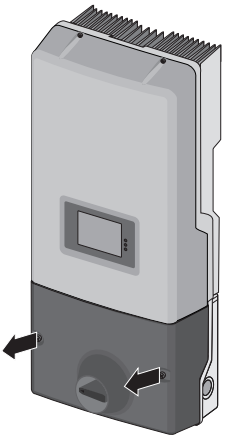
- Before working on the SMA DC-Disconnect, disconnect the AC switch and make sure it cannot be switched on.
- Disconnect the multi-function relay power supply.
- Set the DC disconnector of the SMA DC-Disconnect to the "Off" position.
- Wait 5 minutes before opening the cover of the SMA DC-Disconnect, until the capacitors of the inverter are discharged.

1. Disconnect the AC switch and make sure it cannot be switched on.
2. Turn the DC disconnector to the "Off" position and wait 5 minutes until the capacitors of the inverter are discharged.

   ☑ The inverter is disconnected on the AC and DC sides.



3. Loosen the screws on the enclosure of the SMA DC-Disconnect (turn the screws in a counterclockwise direction). Leave the screws and tab washers on the cover.
4. Remove the cover of the SMA DC-Disconnect towards the front.
5. Place the cover to one side.



☑ The SMA DC-Disconnect is open.

5.2 Connecting the RS485-Quick Module to the RS485 bus

5.2.1 Cable Requirements

The cable length and quality have an effect on the signal quality.

The cable must fulfill the following requirements to guarantee a good signal quality:

- Use cables of type 600V LVLE.
- Diameter of the cable: $^{15}/_{64}$ in. (6 mm) to $^{17}/_{64}$ in. (7 mm).
- Cross-section of the conductors: At least 2 x 2 x AWG 24 (2 x 2 x 0.22 mm²).
- Conductors must be made up of twisted wire pairs.
- The cable must be shielded and double insulated.
- For outdoor use only: the cable must be UV resistant.

You can order suitable cables from SMA.

Purchase order numbers:

- For outdoor use: COMCAB-OUTxxx*

*Available in the lengths xxx = 100 (100 m / 328 ft.); xxx = 200 (200 m / 656 ft.); xxx = 500 (500 m / 1 640 ft.) and xxx = 1 000 (1 000 m / 3 280 ft.)

5.3 Preparing the cable

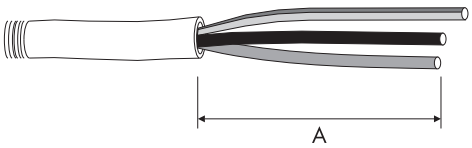
Length of the cable

When the cable has been connected, you must push the RS485-Quick Module approx. 8 in. (200 mm) upwards. Note that the cable has to be long enough to reach the end position of the RS485-Quick Module.

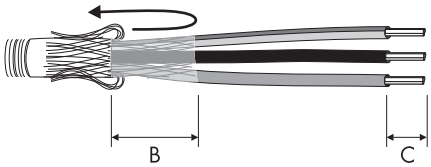
Preparing the cable

Carry out the following steps outside the RS485-Quick Module, to ensure that no metal residues of the shield or the cable fall into the RS485-Quick Module.

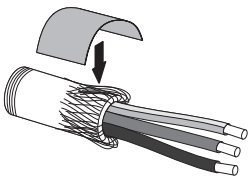
1. Ensure that the RS485 cable is long enough.



2. Shorten the cable sheath and cable shield by 1 $^1/_2$ in. (40 mm) (A).



3. Shorten the cable sheath by $^1/_2$ in. (15 mm) (B). Leave the cable shield on the cable.
4. Shorten the cable shield by $^1/_2$ in. (15 mm) (B) and fold it back.
5. Cut off unused insulated conductors at the cable sheath to prevent a short-circuit. 3 conductors are required. 2 conductors must be twisted.
6. Strip the conductors to a length of $^1/_4$ in. (6 mm) (C).
7. Cover the shield with the delivered conductive adhesive foil.



☑ The cable is prepared.

5.4 Installing the Cable Pipe and Introducing the Cable into the Inverter

1. Push out the filler-plugs of an unused cable opening from the inside of the SMA DC-Disconnect enclosure.

NOTICE

Damage to the SMA DC-Disconnect through enlargement of the cable pipe openings.

- Do not enlarge openings for the cable pipes. The openings are intended for the installation of cable pipes with a size of up to $^3/_4$ in. (19 mm).

2. Install the cable pipe on the free opening of the SMA DC-Disconnect. Use matching nuts on the inside to screw the cable pipes to the the SMA DC-Disconnect.
3. If you want to install a fault sensor on the multi-function relay: Install the distribution box on the cable pipe. The distribution box lets you lead the power supply of the multi-function relay and the RS485 data cable to the DC-Disconnect.
4. Connect the cable pipe for the RS485 data cable and the cable pipe for the power supply of the multi-function relay to the distribution box.

Properties of RS485 cables and the power supply of the multi-function relay

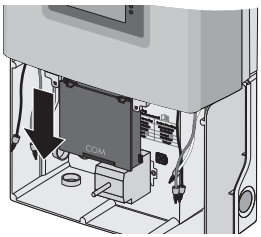
- Cable requirements for RS485 cables: see section 5.2.1 „Cable Requirements“ (page 20)
- Cable requirements for the power supply of the multi-function relay: see section 5.7.1 „Connection Requirements“ (page 26).

5. Lead the RS485 cable into the inverter through the cable pipe.
6. If you want to install fault sensor on the multi-function relay: lead the power supply of the multi-function relay into the inverter through the cable pipe.

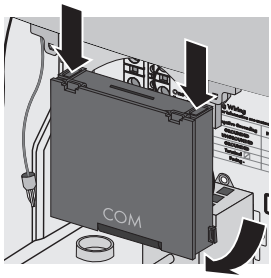
☑ The cable pipes are installed and the cables are led into the inverter.

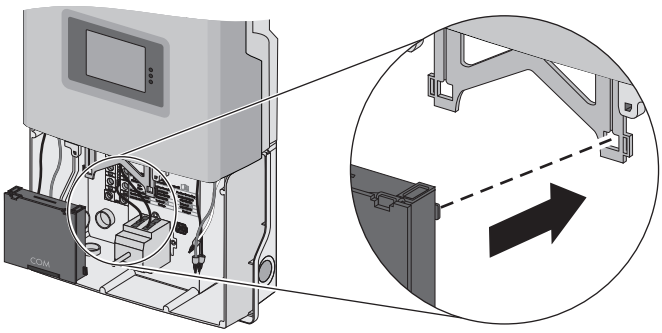
5.5 Replacing Standard Quick Modules with RS485-Quick Modules

1. Open SMA DC-Disconnect (see section 5.1 „Open SMA DC-Disconnect.“ (page 19)).
2. Pull the Quick Module downwards to the stopper.



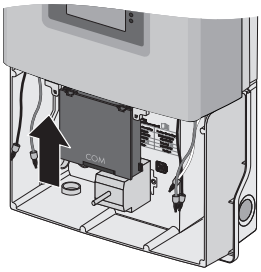
3. Place your thumbs on the upper edge of the Quick Module and carefully push the Quick Module downwards using your thumbs. When the Quick Module is at the end of the bracket, push the bottom edge of the Quick Module forwards.





4. Plug the RS485-Quick Module into the designated holes on the bracket until it snaps into place.
5. Push the RS485-Quick Module carefully upwards.
6. Check that the RS485-Quick Module is securely in place.

   ☑ The RS485-Quick Module is mounted. Should you not have made these settings yet, you can set the installation country, the display language, and the *Bluetooth* communication (see page 15).
7. Close the DC-Disconnect (see section 5.8 „Closing the SMA DC-Disconnect and Commissioning the Inverter“ (page 28)).

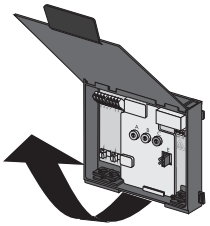


5.6 Connecting the RS485 cable to the RS485-Quick Module

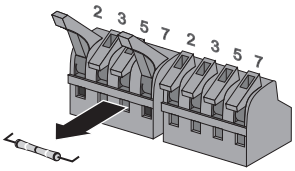
In this guide it is assumed that the inverter is not connected to an end of the RS485 bus. Should the inverter be connected to an end of the RS485 bus, perform the following steps for one cable only.

If one cable is connected (inverter at the end of the RS485 bus) leave the resistor connected to the spring-type terminal of the RS485-Quick Module.. If the resistor is not correctly connected, see section 4.4 „Terminating the RS485 Bus“ (page 18).

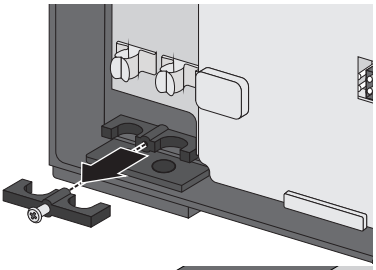
1. Flip up the flap of the RS485-Quick Module and lift the cover until it snaps into place.



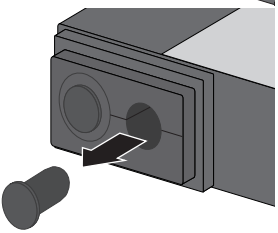
2. When connecting 2 cables (inverter in the middle of the RS485 bus), remove the resistor on the left spring-type terminal.



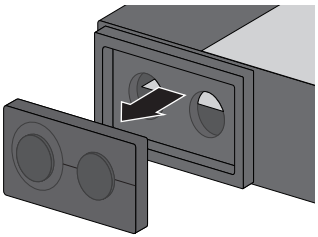
3. Slacken the strain relief screw in a counterclockwise direction.
4. Remove the jumper.



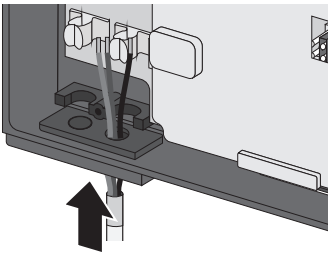
5. Remove the filler-plug from the right-hand cable entry.
6. If two cables are to be connected: remove the filler-plug from the left-hand cable entry.



7. Remove the cable support sleeve.



8. Insert the cable in the cable support sleeve.
9. Lead the end of the cable through the cable entry and into the RS485-Quick Module.

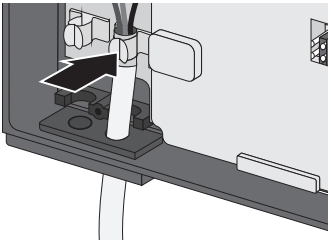


10. Insert the cable support sleeve in the enclosure of the RS485-Quick Module.
11. Open the spring-type terminals.

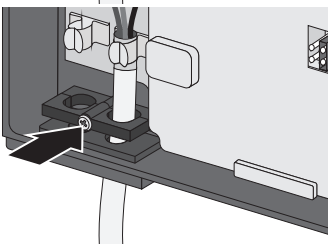
12. Connect conductors to the connector terminals and note down the color of the wires:

	Signal	RS485-Quick Module	Insulated conductor color	RS485 bus
	GND	5		5
	Data+	2		2
	Data-	7		7

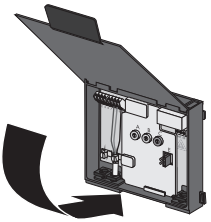
13. Close the spring-type terminals.
14. Push the cable with the shield, stuck to the cable with copper foil, into the shield terminal.



15. Attach the jumper.
16. Using a cross-head screwdriver, tighten the strain relief screw in a clockwise direction with a torque of 13 $^{1}/_{4}$ in-lbs. (1.5 Nm).



17. Close the cover of the RS485-Quick Module and fold back the flap so that it snaps into place.



18. Connect the other end of the cable to the RS485 bus. See the supplied RS485 cabling plan poster for the connection layout and system wiring.

☑ The RS485-Quick Module is connected to the RS485 bus.

5.7 Multi-function relay connection

5.7.1 Connection Requirements

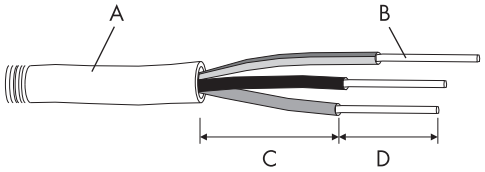
You have the possibility to use an external signal transmitter to display smooth operations as well as errors.

You can switch the following voltages and currents.

	Maximum voltage	Maximum current
AC source	15 V	1.0 A
DC source	30 V	1.0 A

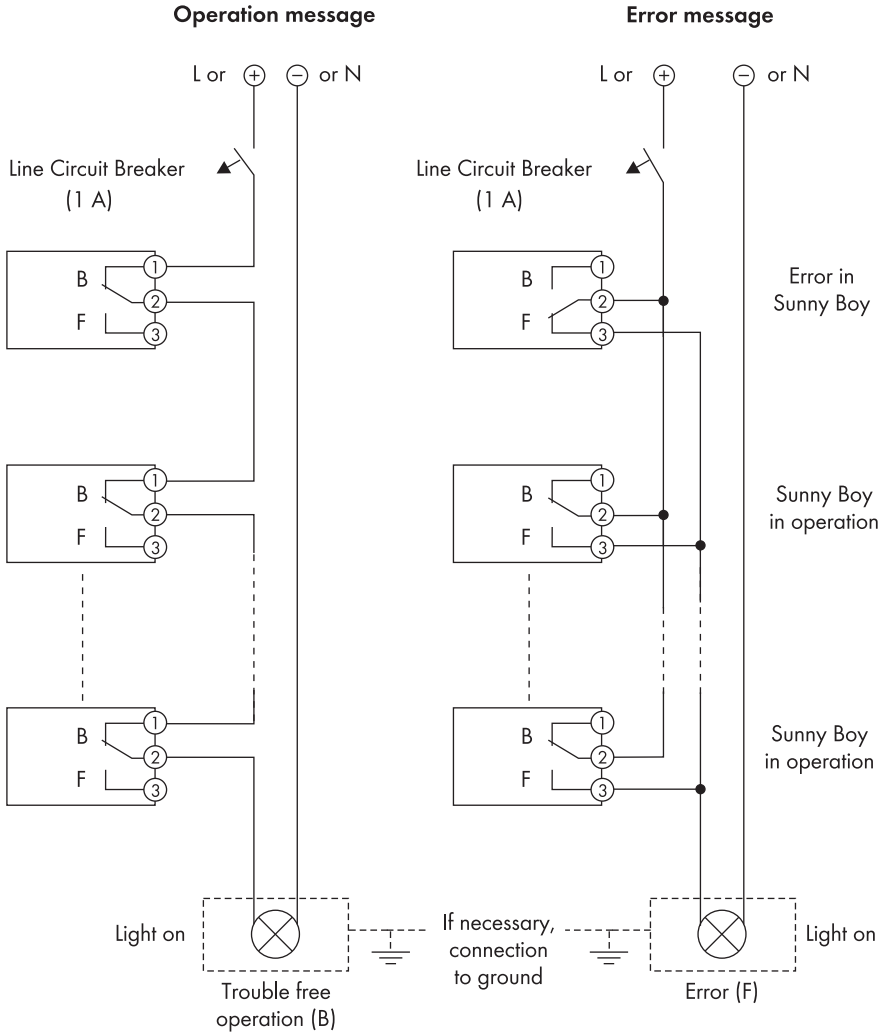
Cable Requirements

- Use cables of type 600V LVLE.
- The cable type and cable-laying method must be appropriate to the application and location.
- The cable must be double-insulated.



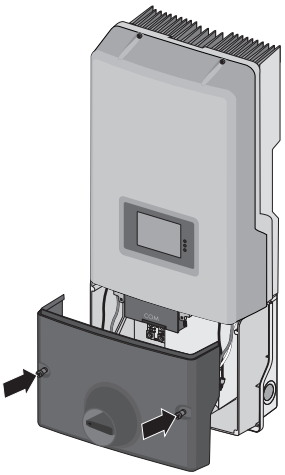
Item	Description	Value
A	External diameter	$^{15}/_{32}$ in. ... $^{1}/_{2}$ in. (11.7 mm ... 12.5 mm)
B	Cross-section of insulated conductor	AWG 20 ... AWG 14 0.5 mm² ... 2.5 mm²
C	Maximum length of the insulated conductor	$^{1}/_{2}$ in. (15 mm)
D	Maximum strip insulation	$^{3}/_{8}$ in. (8 mm)

Connection plan for fault signaling contact



5.8 Closing the SMA DC-Disconnect and Commissioning the Inverter

1. Check the cable routing to ensure that no cable impedes the cover seal and that the cover does not apply pressure to the connections when it is screwed down.
2. Check all of the knockout fittings of the SMA DC-Disconnect and make sure that they provide a weather-tight seal.
3. Place the cover of the SMA DC-Disconnect onto the enclosure.
   - Make sure that the handle in the cover of the SMA DC-Disconnect snaps into the switch of the SMA DC-Disconnect.
   - Make sure that the upper edge of the SMA DC-Disconnect is covered by the lower edge of the inverter.
   - Ensure that the two holes in the cover are aligned exactly to the two threaded holes in the enclosure.



4. Insert the two screws of the cover into the threaded holes of the enclosure and hand tighten them. The teeth of the tab washers must point downwards.

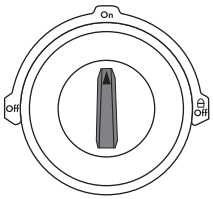
   Be careful not to cross-thread any of the screws.

   Do not use power tools to tighten the screws.
5. Ensure that the cover is correctly positioned.
6. Tighten the cover screws to a torque of 53 in-lbs. (6 Nm).

   Be careful not to cross-thread any of the screws.

   Do not use power tools to tighten the screws.

   ☑ The SMA DC-Disconnect is closed.
7. If the multi-function relay is connected: switch on the multi-function relay supply voltage.
8. Turn the DC disconnecting switch of the SMA DC-Disconnect to the "On" position.
9. Switch-on the AC switch.

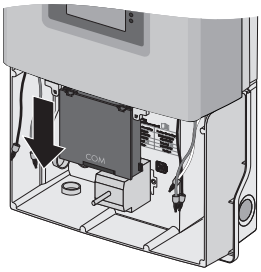


☑ The inverter is in operation. Successful commissioning is indicated by a glowing or blinking green LED.

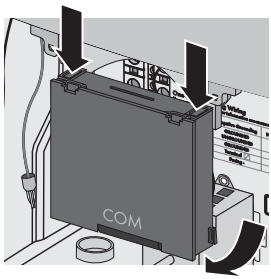
6 Decommissioning and disposal

6.1 Decommissioning

1. If the multi-function relay is connected: switch off the multi-function relay power supply.
2. Open SMA DC-Disconnect (see section 5.1 „Open SMA DC-Disconnect." (page 19)).
3. Pull the RS485-Quick Module downwards to the stopper.



4. Open the cover of the RS485-Quick Module and disconnect all the cable connections in the RS485-Quick Module.
5. Pull the cables out of the RS485-Quick Module and close the cover of the RS485-Quick Module.
6. Lay the thumbs on the upper edge of the RS485-Quick Module and push the RS485-Quick Module downwards using your thumbs. When the RS485-Quick Module is at the end of the bracket, push the bottom edge of the RS485-Quick Module forwards.



☑ The RS485-Quick Module is disassembled.

6.2 Disposal

Dispose of the RS485-Quick Module at the end of its service life in accordance with the disposal regulations for electronic waste which apply at the installation site at that time. Alternatively, send it back to SMA with shipping paid by sender and labeled "ZUR ENTSORGUNG" ("FOR DISPOSAL") (contact: see Page 31).

7 Technical Data

Communication

Communication Interfaces	RS485
Maximum RS485 range	3 935 ft. (1 200 m)

Environmental conditions in operation

Ambient temperature	– 13 °F ... +131 °F (– 25 °C ... +60 °C)
Relative humidity*	5 % ... 95 %

* Non-condensing

Ambient conditions during storage

Ambient temperature	– 40 °F ... +185 °F (–40 °C ... +85 °C)
Relative humidity*	5 % ... 95 %

* Non-condensing

General data

Width x height x depth	4 $^{28}/_{32}$ in. x 3 $^{27}/_{32}$ in. x 1 $^{1}/_{16}$ in. (124 mm x 97.5 mm x 27 mm)
Weight	$^{13}/_{32}$ lbs. (180 g)

Multi-function relay

Maximum AC voltage	15 V
Maximum DC voltage	30 V
Maximum AC current	1.0 A
Maximum DC current	1.0 A

8 Contact

If you have technical problems concerning our products, contact the SMA Serviceline. We need the following information in order to provide you with the necessary assistance:

- Inverter type
- Serial number of inverter
- Type and number of modules connected
- Event number or display of the inverter
- Type of communication, if applicable
- Type of external wiring of multi-functional relay
- Serial number of the RS485-Quick Module

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